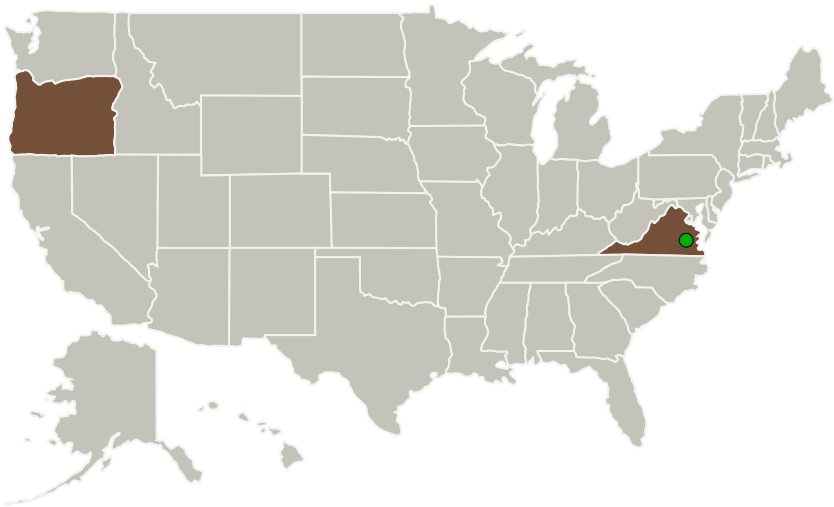
Radiation Induced Fault Analysis for Wide Temperature BiCMOS Circuits, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

State of the art Radiation Hardened by Design (RHBD) techniques do not account for wide temperature variations in BiCMOS process. Silicon-Germanium BiCMOS process offer inherent advantages for operation in radiation environments where single event transient and total iodization dose effects on the circuit are important. Recent access to libraries of wide temperature and RHBD BiCMOS designs provide the reference data for developing radiation aware automation design automation. Lynguent's efficiency gains in compact model composition have enabled radiation domain experts to transfer observed radiation effects from TCAD simulators into the commercial circuit simulators. These compact models are augmented with radiation effects such as the ISDE 90 nm Bulk CMOS Bias Dependent Charge Sharing SET Effect. These rad-aware models are used within the LynRad Fault Analyzer, taking into account circuit schematics, layout and cosmic ray scenarios. Extending this design automation to a BiCMOS AMS designs is the logical next step in establishing radiation awareness over wide temperature. Previous investigations were limited to circuits with a small number of transistors that could be simulated in mixed TCAD-SPICE environments. Consequently, scaling the LynRad Radiation Fault Analyzer to larger, more complex AMS circuits is a key aspect of this investigation.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Lynguent, Inc.	Lead Organization	Industry	Portland, Oregon
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Oregon	Virginia

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139364)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Lynguent, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

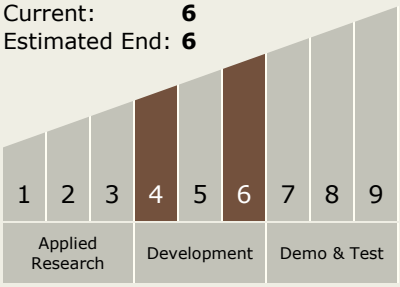
Carlos Torrez

Principal Investigator:

Jim Holmes

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.1 Situational and Self Awareness
    - TX10.1.4 Hazard Assessment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System